

## CLAIMS

What is claimed is:

1. A bearing seal assembly comprising:  
an inner circumferential seal;  
an outer circumferential seal defining a fluid compartment of elevated pressure between the inner circumferential seal and the outer circumferential seal; and  
a backup circumferential seal adjacent one of the outer circumferential seal and the inner circumferential seal.
2. The bearing seal assembly of claim 1 further including a fluid inlet port between the inner circumferential seal and the outer circumferential seal for maintaining the fluid compartment at the elevated pressure.
3. The bearing seal assembly of claim 1 wherein the inner and outer circumferential seals are carbon ring seals.
4. The bearing seal assembly of claim 1 wherein the inner and outer circumferential seals are segmented ring seals.
5. The bearing seal assembly of claim 1 wherein the inner circumferential seal is an oil-side circumferential seal and the outer circumferential seal is an air-side circumferential seal.
6. The bearing seal assembly of claim 5 wherein the backup circumferential seal is adjacent the air-side circumferential seal.

7. A bearing seal assembly for a gas turbine engine comprising:
  - a first circumferential seal;
  - a second circumferential seal axially spaced from the first circumferential seal to define a fluid compartment of elevated pressure; and
  - a third circumferential seal adjacent the first circumferential seal, the third circumferential seal outside the fluid compartment and having pressure lower than the pressure in the fluid compartment between the third circumferential seal and the first circumferential seal.
8. The bearing seal assembly of claim 7 further including a fluid inlet port between the first circumferential seal and the second circumferential seal for maintaining the fluid compartment at the elevated pressure.
9. The bearing seal assembly of claim 8 wherein the first and second circumferential seals are carbon ring seals.
10. The bearing seal assembly of claim 8 wherein the first and second circumferential seals are segmented ring seals.
11. The bearing seal assembly of claim 8 wherein the first circumferential seal is an oil-side circumferential seal and the second circumferential seal is an air-side circumferential seal.
12. The bearing seal assembly of claim 11 wherein the third circumferential seal is adjacent the air-side circumferential seal.
13. The bearing seal assembly of claim 12 further including a spring between the first and second circumferential seals urging the first and second circumferential seals axially apart from one another.

14. A bearing seal assembly for a gas turbine engine comprising:
  - a first seal;
  - a second seal axially spaced from the first seal;
  - a fluid compartment between the first seal and the second seal, an inlet into the fluid compartment disposed between the first and second seals for supplying a fluid at an elevated pressure; and
  - a third seal adjacent one the first seal and outside the fluid compartment, the third seal having a pressure lower than the pressure in the fluid compartment between the third seal and the first seal.